

AP Statistics Review
Multiple Choice Questions #2

21. Senior citizens make up about 12.4% of the American population. If a random sample of 200 Americans is selected, what is the probability that more than 180 of them are *not* senior citizens?

(A) $\binom{200}{180}(0.124)^{180}(0.876)^{20}$

(B) $\binom{200}{180}(0.876)^{180}(0.124)^{20}$

(C) $P\left(z > \frac{180 - 175.2}{\frac{0.124}{\sqrt{200}}}\right)$

(D) $P\left(z > \frac{0.9 - 0.124}{\sqrt{\frac{(0.124)(0.876)}{200}}}\right)$

(E) $P\left(z > \frac{0.9 - 0.876}{\sqrt{\frac{(0.124)(0.876)}{200}}}\right)$

22. An avid tennis fan wishes to determine the average number of points per game in tennis. He takes a random sample of 20 games and finds the mean length to be 5.65 points with a standard deviation of 1.69 points. Which of the following would yield a 95% confidence interval for μ ?

(A) $5.65 \pm 1.96 \frac{1.69}{\sqrt{20}}$

(B) $5.65 \pm 2.086 \frac{1.69}{\sqrt{20}}$

(C) $5.65 \pm 2.093 \frac{1.69}{\sqrt{20}}$

(D) $5.65 \pm 2.086 \frac{1.69}{\sqrt{19}}$

(E) $5.65 \pm 2.093 \frac{1.69}{\sqrt{19}}$

[Type text]

23. In this year's county mathematics competition, a student scored 40; in last year's competition, the student scored 35. The average score this year was 38 with a standard deviation of 2. Last year's average score was 34 with a standard deviation of 1. In which year did the student score better?
- (A) The student scored better on this year's exam.
(B) The student scored better on last year's exam.
(C) The student scored equally well on both exams.
(D) Without knowing the number of test items, it is impossible to determine the better score.
(E) Without knowing the number of students taking the exam in the county, it is impossible to determine the better score.
24. There are 39 known moons orbiting the planet Jupiter. The diameter (in kilometers) and distance from Jupiter (in thousands of kilometers) are recorded for the moons discovered prior to May 2002. The conditions for regression analysis were met and the results follow.

Dependent variable is **Distance (in 1000 km)**
No Selector
R squared = 29.6% R squared (adjusted) = 26.9%
s = 8358 with 28 - 2 = 26 degrees of freedom

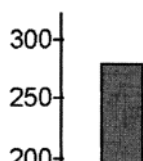
Source	Sum of Squares	df	Mean Square	F-ratio
Regression	763.35e6	1	763.35e6	10.9
Residual	1.81616e9	26	69.8524e6	

Variable	Coefficient	s.e. of Coeff	t-ratio	prob
Constant	16053.1	1714	9.37	≤ 0.0001
Diameter	-3.48571	1.054	-3.31	0.0028

Is there evidence of a relationship between diameter and distance?

- (A) There is no evidence of a relationship between diameter and distance at any of the commonly accepted levels.
(B) There is evidence of a relationship between diameter and distance at the 0.10 level but not at the 0.05 level.
(C) There is evidence of a relationship between diameter and distance at the 0.05 level but not at the 0.01 level.
(D) There is evidence of a relationship between diameter and distance at the 0.01 level but not at the 0.001 level.
(E) There is evidence of a relationship between diameter and distance at the 0.001 level.

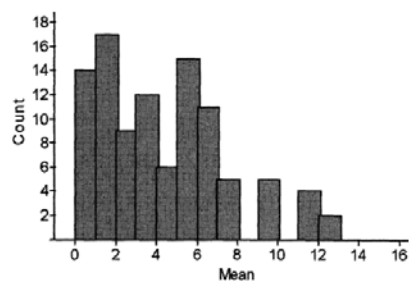
25. Shown below is a distribution with mean 12.262 and standard deviation 9.610.



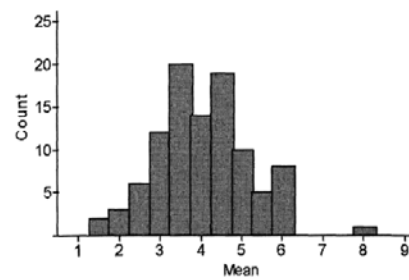
[Type text]

One hundred samples of size 9 are drawn from this population, and the sample means are recorded. Which of the following is most likely to represent this distribution of sample means?

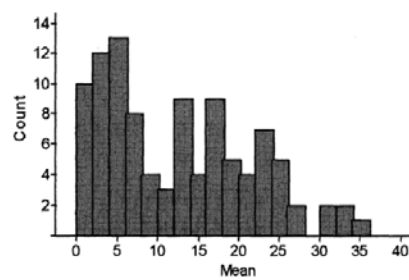
(A)



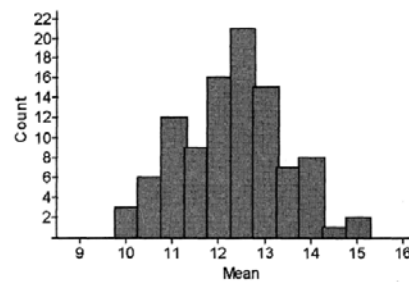
(B)



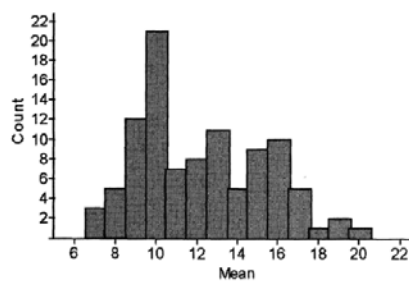
(C)



(D)



(E)



[Type text]

26. Boiling and melting points (in degrees Celsius) are recorded for selected substances, and regression analysis is used to describe the relationship between them. The results of the analysis are shown below:

Dependent variable is **Boiling Point**

No Selector

R squared = 73.4% R squared (adjusted) = 72.0%

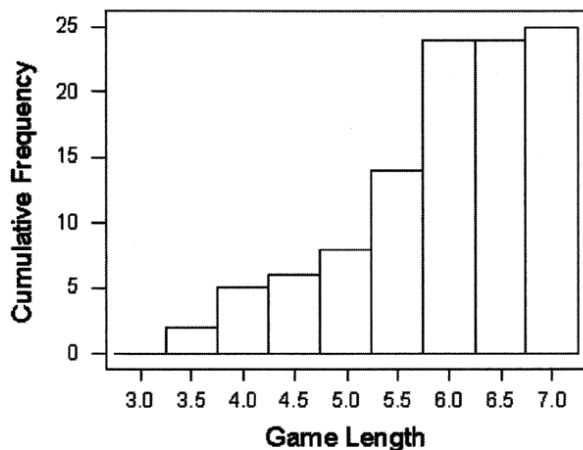
S = 626.4 with 21 - 2 = 19 degrees of freedom

Source	Sum of Squares	df	Mean Square	F-ratio
Regression	20.5469e6	1	20.5469e6	52.4
Residual	7.45573e6	19	392407	

Variable	Coefficient	s.e. of Coeff	t-ratio	prob
Constant	309.914	146.7	2.11	0.0481
Melting Point	0.959388	0.1326	7.24	≤ 0.0001

Assuming all of the conditions for regression have been met, which of the following gives the 95% confidence interval for the slope of the regression line?

- (A) $0.959388 \pm 1.729(0.1326)$
(B) $0.959388 \pm 1.96(0.1326)$
(C) $0.959388 \pm 2.093(0.1326)$
(D) $309.914 \pm 1.729(146.7)$
(E) $309.914 \pm 2.093(626.4)$
27. The lengths (in innings) of 25 randomly selected Little League baseball games were recorded, and a *cumulative* frequency histogram was created from the results. What is the best conclusion that can be made from the graph?

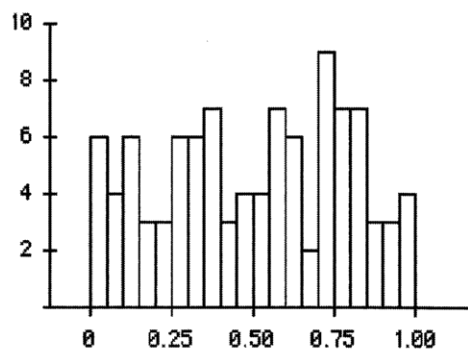


- (A) The median game length is 5 innings.
(B) Fourteen games lasted 5.5 innings.
(C) A majority of the games lasted 6 or more innings.
(D) The distribution of game lengths is severely skewed left.
(E) Games lasting more than 6 innings occurred least frequently.

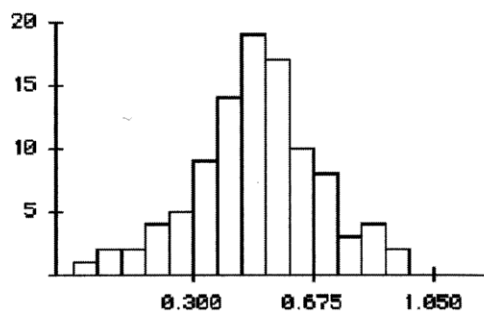
[Type text]

28. For which of the following distributions is the mean greater than the median?

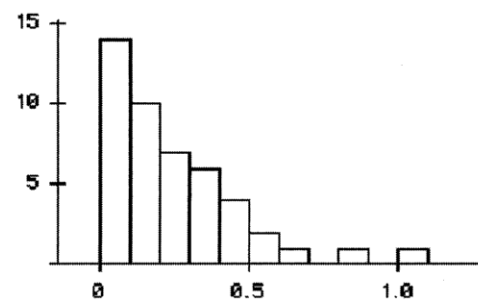
(A)



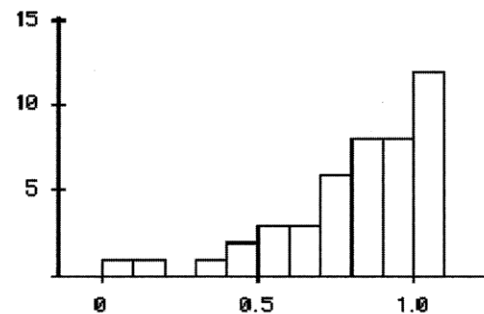
(B)



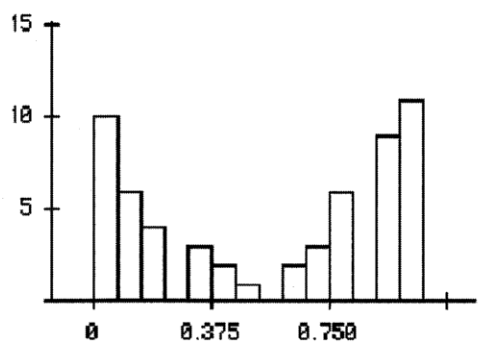
(C)



(D)



(E)



[Type text]

29. A young couple plans to purchase a business. In order to avoid bankruptcy, the couple needs to average more than \$15,000 in sales each month. Before signing the deal, they take a random sample (size 30) from previous months' sales and conduct a test of significance. Use the hypotheses

$$H_0: \mu = 15000$$

$$H_a: \mu > 15000$$

to describe a Type I Error and its consequence for the couple.

- (A) The couple, believing the average sales will be more than \$15,000, will purchase the business and may end up in bankruptcy.
 - (B) The couple, believing the average sales will be more than \$15,000, will purchase the business and may end up with a successful business.
 - (C) The couple, believing the average sales will be \$15,000 or less, will not purchase the business when they may have succeeded had they purchased the business.
 - (D) The couple, believing the average sales will be \$15,000 or less, will not purchase the business because they would have gone bankrupt with the business.
 - (E) The consequence of a Type I Error cannot be assessed unless we are given the α level.
30. Based upon a random sample of 30 seniors in a high school, a guidance counselor finds that 20 of these seniors plan to attend an institution of higher learning. A 90% confidence interval constructed from this information yields (0.5251, 0.80823). Which of the following is a correct interpretation for this interval?
- (A) We can be 90% confident that 52.51% to 80.82% of our sample seniors plan to attend an institution of higher learning.
 - (B) We can be 90% confident that 52.51% to 80.82% of seniors at this high school plan to attend an institution of higher learning.
 - (C) We can be 90% confident that 52.51% to 80.82% of seniors in any school plan to attend an institution of higher learning.
 - (D) This interval will capture the true proportion of seniors from this high school who plan to attend an institution of higher learning 90% of the time.
 - (E) This interval will capture the proportion of seniors in our sample who plan to attend an institution of higher learning 90% of the time.

[Type text]

31. As a promotional gimmick, a cereal manufacturer packages boxes of cereal with CD-ROMs of popular games. There are five different games, but the purchasers do not know which game they are receiving when they purchase the cereal. A child would like to receive one game in particular. What is the probability that the child opens three boxes of cereal before receiving the desired game?
- (A) $\binom{5}{3}(0.2)^3(0.8)^2$
- (B) $\binom{5}{3}(0.2)^2(0.8)^3$
- (C) $\binom{5}{1}(0.6)(0.4)^4$
- (D) $(0.8)^2(0.2)$
- (E) $(0.2)^2(0.8)$
32. A random variable has a standard deviation of 1.3. A new variable is created by transforming the values of the random variable using the following rule: Multiply each value by 2 and then add 5. What is the value of the standard deviation for this transformed variable?
- (A) 1.3
- (B) 2.6
- (C) 6.3
- (D) 7.6
- (E) 8.5
33. Suppose the probability of encountering an American who practices a particular religion is 0.014. What are the mean and standard deviation for the *number* of Americans in a random sample of 500 who practice this religion?
- (A) mean 0.014; standard deviation 0.0006
- (B) mean 0.014; standard deviation 0.0053
- (C) mean 7; standard deviation 0.0006
- (D) mean 7; standard deviation 0.0053
- (E) mean 7; standard deviation 2.627

[Type text]

34. A manufacturer constructs a 95% confidence interval for the average weight of the items he manufactures. His results need to be included in a report to his superiors, and the resulting interval is wider than he would like. In order to decrease the size of the interval the *most*, the manufacturer should take a new sample and
- (A) increase the confidence level and increase the sample size.
 - (B) decrease the confidence level and increase the sample size.
 - (C) increase the confidence level and decrease the sample size.
 - (D) decrease the confidence level and decrease the sample size.
 - (E) The manufacturer will not be able to decrease the size of the interval.
35. A least squares regression line was fitted to the weekly cost of groceries in dollars (cost) versus the number of household members (number) for a group of families. The resulting equation is

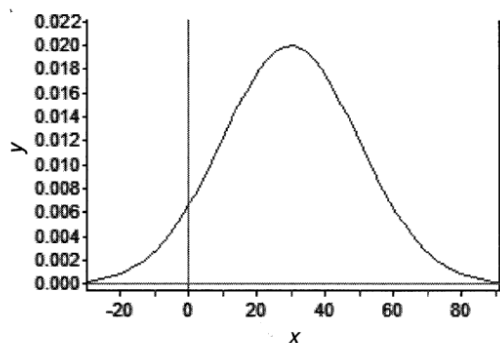
$$\widehat{\text{cost}} = -33.22 + 44.77 (\text{number}).$$

- A randomly selected family of four spends \$135 on groceries in an average week. What is the difference between this family's actual cost and the predicted average family cost?
- (A) -\$10.86
 - (B) -\$0.24
 - (C) \$ 0.24
 - (D) \$ 10.86
 - (E) \$ 145.86
36. A random sample of adults is taken in a rural county. Of the 120 adults sampled, 16 live in poverty. The poverty rate for the entire state is 8.9%. Is there statistical evidence to show that the poverty rate of this county is higher than that of the state?
- (A) Since 13.33% is greater than 8.9%, there is sufficient evidence at the $\alpha = 0.05$ level to show that the poverty rate of the county is higher than that of the state.
 - (B) Since 4.40% is less than 8.9%, there is insufficient evidence at the $\alpha = 0.05$ level to show that the poverty rate of the county is higher than that of the state.
 - (C) Since 1.706 is less than 8.9, there is insufficient evidence at the $\alpha = 0.05$ level to show that the poverty rate of the county is higher than that of the state.
 - (D) Since 1.706 is greater than 1.645, there is sufficient evidence at the $\alpha = 0.05$ level to show that the poverty rate of the county is higher than that of the state.
 - (E) Since 0.044 is less than 0.05, there is insufficient evidence at the $\alpha = 0.05$ level to show that the poverty rate of the county is higher than that of the state.

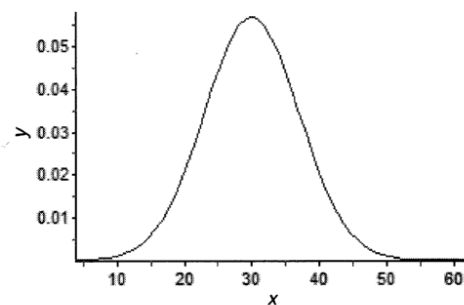
[Type text]

37. Which of the following distributions has a mean of 30 and a standard deviation of 7?

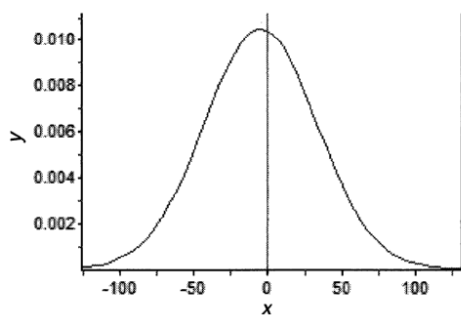
(A)



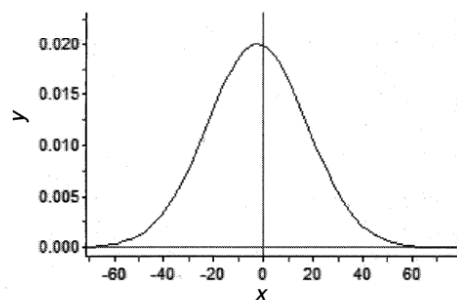
(B)



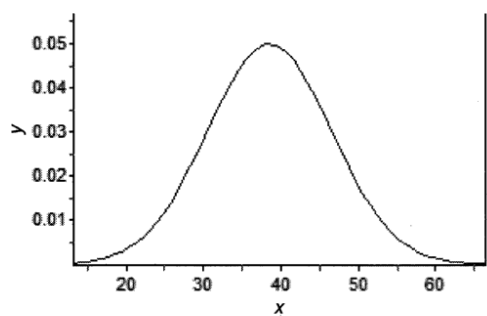
(C)



(D)



(E)



[Type text]

38. Two manufacturers of canned goods add different amounts of water to their canned vegetables. For a 15.25-oz can of vegetables, one manufacturer adds a mean of 4.5 oz with a standard deviation of 0.63 oz. The other manufacturer adds a mean of 5.1 oz with a standard deviation of 0.57 oz. What are the mean and standard deviation for the difference in the amount of water added? (Assume independence for the manufacturers.)

(A) mean 0.6 oz; standard deviation 0.06 oz
(B) mean 0.6 oz; standard deviation 0.85 oz
(C) mean 0.6 oz; standard deviation 0.072 oz
(D) mean 9.6 oz; standard deviation 0.06 oz
(E) mean 9.6 oz; standard deviation 1.20 oz

39. An airline has an ontime probability of 82.4%. What is the probability that if you travel on this airline, no more than 3 of your next 10 flights will *not* be on time?

(A) $\binom{10}{3}(0.176)^3(0.824)^7$
(B) $\binom{10}{3}(0.824)^3(0.176)^7$
(C) $\binom{10}{0}(0.176)^0(0.824)^{10} + \binom{10}{1}(0.176)^1(0.824)^9 + \binom{10}{2}(0.176)^2(0.824)^8$
(D) $\binom{10}{0}(0.824)^0(0.176)^{10} + \binom{10}{1}(0.824)^1(0.176)^9 + \binom{10}{2}(0.824)^2(0.176)^8$
(E) $\binom{10}{0}(0.176)^0(0.824)^{10} + \binom{10}{1}(0.176)^1(0.824)^9 + \binom{10}{2}(0.176)^2(0.824)^8 + \binom{10}{3}(0.176)^3(0.824)^7$

[Type text]

40. A no-appointment haircutter advertises an average wait time of 15 minutes for customers. A consumer advocacy group has received several complaints from customers who believe the wait time is really 30 minutes. The advocacy group randomly selects 30 customers, records wait times, and calculates the power of the test to be 50%. In order to increase the power of the test *as much as possible*, the advocacy group should
- (A) increase the sample size and increase the value of α .
 - (B) increase the sample size and decrease the value of α .
 - (C) increase the sample size but keep the same value for α .
 - (D) decrease the sample size and increase the value of α .
 - (E) decrease the sample size and decrease the value of α .